

CLAIMS

What is claimed is:

1. A semiconductor device comprising:
 - a bonding pad portion provided on an insulating film;
 - a passivation film provided on the bonding pad portion and the insulating film; and
 - a pad opening portion provided in the passivation film at a position located on the bonding pad portion,wherein the bonding pad portion has a barrier metal layer and a conductive film provided on the barrier metal layer, and
 - at least a part of the barrier metal layer located under the pad opening portion and between the insulating film and the conductive film is removed.
2. A semiconductor device comprising:
 - an insulating film provided on a wire;
 - a connecting hole provided in the insulating film at a position located on the wire;
 - a barrier metal layer provided in the connecting hole and on the insulating film;
 - a metal plug provided on the barrier metal layer in the connecting hole;
 - a conductive film provided on the metal plug and the barrier metal layer, the conductive film and the barrier metal layer forming a bonding pad portion;
 - a passivation film provided on the bonding pad portion and the insulating film; and

a pad opening portion provided in the passivation film at a position located on the bonding pad portion,

wherein at least a part of the barrier metal layer located under the pad opening portion and between the insulating film and the conductive film is removed.

3. The semiconductor device according to Claim 2, wherein the pad opening portion is not located over the metal plug.

4. A semiconductor device comprising:

an insulating film provided on a wire;

a connecting hole provided in the insulating film at a position located on the wire;

a barrier metal layer provided in the connecting hole and on the insulating film;

a sidewall provided on the inside surface of the connecting hole with the barrier metal layer provided therebetween;

a conductive film provided on the sidewall, in the connecting hole, and on the barrier metal layer, the conductive film and the barrier metal layer forming a bonding pad portion;

a passivation film provided on the bonding pad portion and the insulating film; and

a pad opening portion provided in the passivation film at a position located on the bonding pad portion,

wherein the bonding pad portion is electrically connected to the wire via the conductive film, the sidewall, and the barrier metal layer, which are provided in the connecting hole, and

at least a part of the barrier metal layer located under the pad opening portion and between the insulating film and the conductive film is removed.

5. The semiconductor device according to Claim 1, wherein the barrier metal layer comprises a Ti film and a TiN film provided thereon.

6. The semiconductor device according to Claim 1, wherein the insulating film is a film made of a material comprising Si.

7. A method for manufacturing a semiconductor device, comprising:
a step of forming a barrier metal layer on an insulating film;
a removing step of removing at least a part of the barrier metal layer located under a position at which a pad opening portion is to be formed;
a step of forming a conductive film on the barrier metal layer and the insulating film exposed by the removing step;
a step of patterning the conductive film and the barrier metal layer so as to form a bonding pad portion on the insulating film;
a step of forming a passivation film on the bonding pad portion and the insulating film; and
a step of forming the pad opening portion in the passivation film at a position located on the bonding pad portion.

8. A method for manufacturing a semiconductor device, comprising:

a step of forming an insulating film on a wire;

a step of forming a connecting hole in the insulating film at a position located on the wire;

a step of forming a barrier metal layer in the connecting hole and on the insulating film;

a step of forming a metal film on the barrier metal layer and in the connecting hole;

a step of forming a metal plug in the connecting hole by removing the metal film present above the insulating film;

a removing step of removing at least a part of the barrier metal layer located under a position at which a pad opening portion is to be formed;

a step of forming a conductive film on the insulating film exposed by the removing step, the barrier metal layer, and the metal plug;

a step of patterning the conductive film and the barrier metal layer so as to form a bonding pad portion on the insulating film;

a step of forming a passivation film on the bonding pad portion and the insulating film; and

a step of forming the pad opening portion in the passivation film at a position located on the bonding pad portion.

9. A method for manufacturing a semiconductor device, comprising:

a step of forming an insulating film on a wire;

a step of forming a connecting hole in the insulating film at a position located on the wire;

a step of forming a barrier metal layer in the connecting hole and on the insulating film;

a step of forming a sidewall on the inside surface of the opening portion with the barrier metal layer provided therebetween;

a removing step of removing at least a part of the barrier metal layer located under a position at which a pad opening portion is to be formed;

a step of forming a conductive film on the insulating film exposed by the removing step, on the barrier metal layer, and in the connecting hole;

a step of patterning the conductive film and the barrier metal layer so as to form a bonding pad portion on the insulating film;

a step of forming a passivation film on the bonding pad portion and the insulating film; and

a step of forming the pad opening portion in the passivation film at a position located on the bonding pad portion.

10. A method for manufacturing a semiconductor device, comprising:

a step of forming an insulating film on a wire;

a step of forming a connecting hole in the insulating film at a position located on the wire;

a step of forming a barrier metal layer in the connecting hole and on the insulating film;

a step of forming a metal film on the barrier metal layer and in the connecting hole;

a step of forming a metal plug in the connecting hole by removing the metal film present above the insulating film;

a removing step of removing at least a part of the barrier metal layer located under a position at which a pad opening portion is to be formed;

a step of forming a conductive film on the insulating film exposed by the removing step, the barrier metal layer, and the metal plug;

a step of patterning the conductive film and the barrier metal layer so as to form a bonding pad portion on the insulating film;

a step of forming a passivation film on the bonding pad portion and the insulating film; and

a step of forming the pad opening portion in the passivation film at a position which is located on the bonding pad portion and which is not located over the metal plug.

11. A method for manufacturing a semiconductor device, comprising:

a step of forming an insulating film on a wire;

a step of forming a connecting hole in the insulating film at a position located on the wire;

a step of forming a barrier metal layer in the connecting hole and on the insulating film;

a step of forming a metal film on the barrier metal layer and in the connecting hole;

a removing step of removing the metal layer and the barrier metal layer present on the insulating film so as to form a metal plug in the connecting hole;

a step of forming a conductive film on the insulating film exposed by the removing step and the metal plug;

a step of patterning the conductive film so as to form a bonding pad portion on the insulating film;

a step of forming a passivation film on the bonding pad portion and the insulating film; and

a step of forming a pad opening portion in the passivation film at a position located on the bonding pad portion.

12. A method for manufacturing a semiconductor device, comprising:

a step of forming an insulating film on a wire;

a step of forming a connecting hole in the insulating film at a position located on the wire;

a step of forming a barrier metal layer in the connecting hole and on the insulating film;

a step of forming a sidewall on the inside surface of the opening portion with the barrier metal layer provided therebetween;

a removing step of removing the barrier metal layer present on the insulating film;

a step of forming a conductive film on the insulating film exposed by the removing step and in the connecting hole;

a step of patterning the conductive film so as to form a bonding pad portion on the insulating film;

a step of forming a passivation film on the bonding pad portion and the insulating film; and

a step of forming a pad opening portion in the passivation film at a position located on the bonding pad portion.

13. A method for manufacturing a semiconductor device, comprising:

- a step of forming an insulating film on a wire;
- a step of forming a connecting hole in the insulating film at a position located on the wire;
- a step of forming a barrier metal layer in the connecting hole and on the insulating film;
- a step of forming a metal film on the barrier metal layer and in the connecting hole;
- a removing step of removing the metal layer and the barrier metal layer present on the insulating film so as to form a metal plug in the connecting hole;
- a step of forming a conductive film on the insulating film exposed by the removing step and the metal plug;
- a step of patterning the conductive film so as to form a bonding pad portion on the insulating film;
- a step of forming a passivation film on the bonding pad portion and the insulating film; and
- a step of forming a pad opening portion in the passivation film at a position which is located on the bonding pad portion and is not located over the metal plug.

14. The method for manufacturing a semiconductor device according to Claim 11, wherein the bottom layer forming the conductive film is not made of a Ti film.

15. A semiconductor device comprising:
- a bonding pad portion provided on an insulating film;
 - a passivation film provided on the bonding pad portion and the insulating film; and
 - a pad opening portion provided in the passivation film at a position located on the bonding pad portion,
- wherein the bonding pad portion has a barrier metal layer and a conductive film provided on the barrier metal layer, and
- at least a part of an area located under the pad opening portion and between the insulating film and the conductive film is free of the barrier metal layer.